

# **airClient Nexus sB3410**



## **User Guide**

**Version 1.4**

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## About This Document

This User Guide is for the networking professional who configures and manages the smartBridges' Intelligent Nexus Platform of wireless client devices (airClient™ Nexus).

It provides detailed information on using the web-based configuration GUI to configure the airClient Nexus unit. This manual will help you gain a better understanding of how the various components of Nexus work.

To configure smartBridges' products, you need to have fundamental understanding of the concepts and technology of Local Area Networks (LAN) and wireless networking. The system installer will require expertise in the following areas:

- Outdoor radio equipment installation
- Network configuration
- Use of web browser for system configuration, monitoring and fault finding

In this chapter, you will find an overview of the User Guide and where to obtain additional information regarding installation and set-up.

## Overview of User Guide

This User Guide provides all necessary information needed to set up, configure and deploy the airClient Nexus. The first chapter gives information on the configuration features and the system requirements.

The second chapter provides detailed information on deploying the airClient Nexus in Bridge, Router or NAT mode and modifying the various configuration settings. The process of configuring the radio performance parameters and Bandwidth Controller is similar for all three modes and is shown in chapter 3.

The Site Survey Tool is explained in Chapter 4 and the Antenna Alignment procedure in Chapter 5.

Chapter 6 shows how to display the Wireless and Ethernet Traffic Statistics. In Chapter 7 information on the system configuration tools, using the Profile Manager, conducting Link Test and estimating the Link Budget is given.

The steps for upgrading to the latest firmware are shown in Chapter 8. The abbreviations and acronyms used in this User Guide are explained in the Appendix.

## Related Publications

These documents provide complete information about the Nexus series of radio units: airHaul™, airPoint™ and airClient.

- Quick Install Guide (QIG)
- Release Notes
- Technical Specification

All the information can also be found on our website at <http://www.smartbridges.com/>

## Technical Support Center

Comprehensive technical support by dedicated smartBridges engineers is available to all customers through the smartBridges support center website. The website provides updated tools and documents to help troubleshoot and resolve technical issues related to smartBridges products and technologies. To access the technical support resources, please visit the support center website at <http://www.smartbridges.com/support/>

You will need to register for certain services and downloads on the smartBridges support center website.



## 1. Introduction

This User Guide provides information on how to set-up and deploy the airClient unit. A web-based management tool is provided to assist the user to configure the airClient unit for different purposes.

The airClient web-based management tool provides the user with the following features:

1. System configuration
2. Device operational mode configuration
3. Ethernet and wireless IP configurations
4. Radio (SSID, domain, channel, etc) parameter configuration
5. Network bridge (STP, etc) parameter configuration
6. Bandwidth management
7. Antenna alignment
8. Traffic Statistics
9. Site Survey
10. Profile management
11. User management
12. Link Test
13. Link Budget Planning Calculator
14. Firmware Upgrade

### 1.1. System Requirements

The following are the minimum system requirements for the airClient Nexus web-based configuration management tool:

1. Operating System: either Windows 98/2000/XP/NT or Linux
2. Connection to the internet for downloading the latest firmware and Sun JRE
3. Web browser: either Internet Explorer 5.0 and higher, Netscape 7.2 and higher, Mozilla 1.7 and higher or Mozilla Firefox 0.8 and higher
4. SUN JRE: v1.5 and above. You may download it from <http://java.sun.com/j2se/1.5.0/download.jsp>

## 1.2. Checklists

### Pre-Installation Checklist for airClient

<b>Organization Name/Site Name</b>	
<b>Address</b>	
<b>City</b>	
<b>State</b>	
<b>Zip Code</b>	
<b>Telephone Number</b>	

Site Survey and Link Planning				
No	Parameters	Units	Site A	Site B
1	Regulatory Standard to be followed	FCC/ETSI		
2	Frequency Band	2.4GHz 5.25-5.35 5.47-5.725 5.725-5.805		
3	Maximum Output Power as per the Regulatory Authority	100mW/1W/4W		
4	Latitude	Deg Min Sec		
5	Longitude	Deg Min Sec		
6	UPS Installed	Yes/No		
7	UPS specification if any	KVA		
8	Line Voltage	90V-264V AC,50-60 Hz		
9	Near Line of site between sites	Yes/No		
10	Height of tower	Feet/Meters		
11	Repeater required to achieve a link	Yes/No		
12	If Repeater required, then reason why	For example, to achieve long distance/LOS etc		
13	No. of repeaters required	No		
14	Required Throughput	Mbps		
15	Distance between sites	Miles/km		
16	Antenna Type	Parabolic/sector		
17	Antenna Mfg.	smartBridges/Name of other manufacturer		
18	Gain of antenna	dBi		
19	Antenna Polarization	Horizontal/Vertical		
20	Beam width of antenna	Horizontal - deg		
		Vertical – deg		
21	Type of external cable type	LMR 400/LMR600/		

No	Parameters	Units	Site A	Site B
22	Length of external cable connecting a Radio and antenna	Feet/meters		
23	Fade Margin taken into account for a link budgeting	Ideally between 10 to 20 dBm		
24	Model of smartBridges airClient equipment selected for a link. Please refer to note below for selecting the right equipment	sB3410		
25	Grounding- Earth to Neutral Voltage	Ideally less than 2 Volts		
26	Length of the Ethernet cable required for powering a unit	Feet/meters		
27	Choose a best channel which can be used on the basis of site survey with a help of scanning tools like Netstumbler	Specify channel number		

Pre Installation Lab Testing of Equipment				
No	Parameters	Units	Site A	Site B
1	Network diagram along with IP address of all the interfaces for link to be setup in place	Yes/No		
2	Availability of Quick Installation Guide	Yes/No		
3	Availability of User Guide and CD	Yes/No		
4	Ensure that all items listed in the "Package Contents" of Quick Installation Guide are included in the shipment	Yes/No		
5	Availability of Installation Kit	Yes/No		
6	Radio MAC address of Access Point	Yes/No		
7	Configured for pre installation testing	Yes/No		
8	Ping response	ms		
9	Ping Success Rate	Percentage %		
10	Throughput test (Upload/Download)	Varies depending on the Bandwidth Control, signal strength, link quality and distance		

**Note: Economical One radio model (sB3410)**

As much as 6 Mbps data throughput with a range of up to 10 miles (16km)

<b>Signature of Engineer:</b>	
<b>Name:</b>	
<b>Email:</b>	
<b>Date:</b>	



### Post-Installation Checklist for airClient

<b>Organization Name/Site Name</b>	
<b>Address</b>	
<b>City</b>	
<b>State</b>	
<b>Zip Code</b>	
<b>Telephone Number</b>	

General Configuration Information				
No	Parameters	Units	Site A	Site B
1	Radio operations Mode	Bridge/Router/NAT		
2	SSID of a Radio	Up to 32 characters		
3	IP address of Ethernet Port	32-bit numeric address		
4	IP address of Wireless Port	32-bit numeric address		
5	Noise Floor	dBm		
6	RSSI	dBm		
7	Channel selected for Link			
8	Radio TX Output Power	(-5 to +23 dBm)		
9	Model of smartBridges airClient equipment selected for a link.	sB3410		
10	Antenna Type	Parabolic/sector		
11	Antenna Mfg.	smartBridges/Name of other manufacturer		
12	Antenna Polarization	Horizontal/Vertical		
13	Beam width of antenna	Horizontal – deg		
		Vertical – deg		
14	Antenna Gain	dBi		

Checklist				
No	Parameters	Units	Site A	Site B
1	Check out the crimping of the Ethernet cable at both the ends	Yes/No		
2	Check out the proper grounding of the antenna and equipment	Yes/No		
3	Ensure no extreme bends or kink's in the cable	Yes/No		
4	Ensure Ethernet cable is not running near a sharp edge	Yes/No		
5	Ensure airClient along with antenna is fixed properly on a tower with the help of nuts and bolt supplied in packaging	Yes/No		
6	Ensure antenna is pointed to get the best RSSI and link Quality	Yes/No		
7	Ping response	ms		
8	Ping success rate	Percentage		
9	Throughput test (Upload/Download)	Mbps		
10	Link stability based on observation for 1 Hr	Yes/No		

<b>Signature of Engineer:</b>	
<b>Name:</b>	
<b>Email:</b>	
<b>Installation Date:</b>	
<b>Commissioned Date:</b>	

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## 2. airClient Configuration

The airClient can work in one of three modes: Bridge, Router or NAT. The procedures for configuring the various parameters in each mode are outlined in this chapter.

### 2.1. User Login and License Agreement

The airClient unit comes with a pre-configured default Ethernet (wired-side) IP address: **192.168.0.207** and subnet mask: 255.255.255.0. This default device IP address should be used when accessing the device configuration management interface for the first time using a web-browser (Enter **http://192.168.0.207** for the URL address). In addition, the Sun Java Plug-in should be installed. The PC must be on the same subnet as the airClient unit.

Follow the steps below to login as an Administrator to the web-based configuration management interface system:

1. Connect the airClient using the Power over Ethernet (PoE) to a PC or network via the ETH A or ETH B port. (Please refer to the Quick Install Guide for more information on connections).
2. Open a web browser on the PC and enter the device IP address 192.168.0.207 in the web browser address field and press the Enter key.
3. A user login box will appear. Enter the 'User name' and 'Password' and check the 'Remember my password' checkbox if you want the system to remember the password. The default user name is **Administrator** and the password is **smartBridges** (case sensitive).



Figure 2-1 Administrator Login

4. Click the 'OK' button. A License agreement page will appear as shown in Fig 2-2 below
5. Click 'Accept'. The airClient 'Nexus Summary Information' page (Fig 2-3) will appear

**Terms of use :**

Terms of use

READ THE TERMS OF THIS AGREEMENT AND ANY PROVIDED SUPPLEMENTAL LICENSE TERMS FROM THE [http://www.smartbridges.com/web/support/ah\\_nexus.asp](http://www.smartbridges.com/web/support/ah_nexus.asp) link (COLLECTIVELY "AGREEMENT") CAREFULLY BEFORE USING THE SOFTWARE PACKAGE. BY USING THE SOFTWARE PACKAGE, YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCESSING THE SOFTWARE ELECTRONICALLY, INDICATE YOUR ACCEPTANCE OF THESE TERMS BY SELECTING THE "ACCEPT" BUTTON AT THE END OF THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL THESE, SELECT THE "DECLINE" BUTTON AT THE END OF THIS AGREEMENT

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2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Please refer to the URL below for latest updates to the Software Warranty Statement

**Figure 2-2 License Agreement Page**

Home	Networking	Radio	Tools	Help	Logout
Summary Information :			airClient (sB3410) - <a href="#">Bridge mode</a>		
Wireless Configuration			Ethernet Configuration		
SSID	NEXUS_MASTER		IP Address	192.168.0.207	
Channel	4 - (2427 MHz)		IP Mask	255.255.255.0	
RSSI (dBm)	-41		Gateway	0.0.0.0	
Maximum Wireless Throughput (Kbps)	512		DHCP	Disabled	
Port Information					
ETH A MAC Address	00:30:1A:1C:3D:B7				
ETH B MAC Address	00:30:1A:1C:3D:B8				
Radio MAC Address	00:30:1A:1F:48:2B				

**Figure 2-3 Nexus Summary Information Page**

The page information descriptions are provided in the table below:

**Table 2-1 Description of Parameters**

Page Item		Descriptions
<b>Ethernet Configuration</b>	IP Address	Editable Ethernet IP Address.
	IP Mask	Editable Ethernet IP subnet Mask
	Gateway	Editable Gateway IP address.
	DHCP	Editable DHCP status Disabled / Enabled User can enable DHCP by ticking the check box to obtain an IP address from the network DHCP server
<b>Wireless Configuration</b>	SSID	Device SSID.
	Channel	Device operation channel.
	RSSI	RSSI value when associated
	Maximum Wireless Throughput	Maximum Wireless Throughput in kbps
<b>Port Information</b>	ETH A MAC Address	Ethernet A (wired side) MAC address. Display only
	ETH B MAC Address	Ethernet B (wired side) MAC address. Display only
	Radio MAC Address	Radio MAC address. Display only
<b>Operational Mode</b>	Device operational mode	Current device operational mode, either as airClient Bridge or airClient Router or airClient NAT mode.

## 2.2. Web GUI Administrator Password Change

By default the administrator password is **smartBridges** (case sensitive).

Follow the steps below to change the Administrator password.

1. Click on the **Tools | User Manager** drop down menu in the navigation menu bar. An **Administrator Password Change** GUI will appear.
2. Enter the fields for **Old Password**, new **Authentication Password** and **Confirm new Authentication Password**.
3. Click on the **Apply Changes** button to change the password.

Tools : User Manager
airClient (sB3410) - [Bridge mode](#)

**Administrator Password Change**

Enter Old Password :

Enter new Authentication Password :

Confirm new Authentication Password :

Apply Changes

**Figure 2-4 Administrator Password Change**

## 2.3. Using the Configuration Pages

The airClient Nexus configuration system comprises several pages for configuring each parameter. A common navigation menu bar is provided at the top of each page for easy navigation as shown in the figure below.

Home	Networking	Radio	Tools	Help	Logout
Summary Information :			airClient (sB3410) - <a href="#">Bridge mode</a>		
<u>Wireless Configuration</u>			<u>Ethernet Configuration</u>		
SSID	NEXUS_MASTER		IP Address	<input type="text" value="192"/>	<input type="text" value="168"/>
Channel	56 - (5280 MHz)		IP Mask	<input type="text" value="255"/>	<input type="text" value="255"/>
RSSI (dBm)	-41		Gateway	<input type="text" value="0"/>	<input type="text" value="0"/>
Maximum Wireless Throughput (Kbps)	15360		DHCP	<input type="checkbox"/>	
<b>Port Information</b>			<input type="button" value="Apply Changes"/>		
ETH A MAC Address	00:30:1A:1C:3C:C5				
ETH B MAC Address	00:30:1A:1C:3C:C6				
Radio MAC Address	00:30:1A:1F:48:37				

**Figure 2- 5 Navigation Menu Bar showing editable boxes for parameters**

System configuration information is displayed as read-only in each page. As shown in the '**Summary Information**' page in the above figure, 'Ethernet Configuration', 'Wireless Configuration', 'Port Information' parameters are displayed as read only.

Clicking on the **UNDERLINED** parameter heading allows you to edit the configuration parameters. To change the 'Ethernet Configuration' parameters, click on the 'Ethernet Configuration' link. Similarly, clicking on the 'Wireless Configuration' link the 'Radio Configuration page' will be displayed to edit any wireless settings. The figure below shows the 'Ethernet Configuration' parameters in editable boxes.

To save the changes to the system, click on the 'Apply Changes' button.

**Note:** Clicking the web browser's Back button returns to the previous screen *without* saving any changes. Changes are saved only when the user clicks the 'Apply Changes' button

The Navigation menu bar contains menu items that allow user to go to different configuration pages. The following table summarizes functionalities available for the menu item links.

**Table 2-2 Description of Menus**

Menu Item	Menu Sub-items	Description
<a href="#">Home</a>	Summary Information	Displays summary page with information such as Ethernet and Wireless IP settings.  Allows user to set the IP settings for Ethernet (wired side) and Wireless interfaces depending on the device operational mode.

Menu Item	Menu Sub-items	Description
Networking	Bridge Configuration	Displays the bridge address, generic bridge port table, spanning tree port table for ports ETH A, ETH B, Radio A., etc  Bridge configuration option is available when airClient is configured in airClient Bridge.
	DHCP	Configure DHCP server or Relay  This option is available only if airClient is configured in airClient Router/NAT mode
	Traffic Statistics	Displays the Ethernet and Wireless Traffic Statistics
	Bandwidth Controller	Allows bi-directional bandwidth management of the wireless link.
	Routing Table	Allows user to view, add and delete static routes.  Routing table is only available for airClient Router mode.
Radio	Main	Wireless Settings: Allows user to set SSID, Channel, ACL Controls and Country, as well as Dial a Power. Provides a link to view association Link Status.  Performance: Allows user to set Fragment Length, RTS/CTS Length, RSSI Threshold and Throughput Optimizer. Radio Operation mode is set to mixed 802.11a/b/g by default.  Data Encryption: Allows user to set the WEP Keys and to choose between Open/Shared System modes of authentication.  Wireless Traffic Statistics: Displays the Wireless Traffic Statistics.
Tools	System Configuration	System Name: Allows user to change the name of the airClient unit  System Description: Allows user to enter a description of the airClient unit  SNMP Security: Allows user to set the SNMP Community String and SNMP

Menu Item	Menu Sub-items	Description
		<p>Access Filters</p> <p>Reset: Resets the device remotely</p> <p>Delayed Reset: Schedules delayed reset at a future time</p> <p>NTP Server : Allows user to change NTP Server settings</p> <p>Firmware Version: Shows firmware's current version</p> <p>Radio Firmware Version: Shows firmware's current radio Version</p>
		<p>Reset to Defaults: Resets the device to factory default values.</p> <p>Ethernet MTU Size: Allows user to set the Ethernet MTU size for different applications.</p> <p>Syslog server IP Address Allows user to set the Syslog server IP and log level.</p> <p>SNMP Trap server IP Address Allows user to set the SNMP Trap server IP for SNMP trap forwarding.</p> <p>LED Control Allows user to turn on/off LED .</p> <p>Operational mode Allows the User to set the Radio Operational mode.</p>
	Profile Manager	<p>Save Profile Allows user to define and save up to three device operating profiles for easy device management. One installation profile is always available.</p> <p>Operating Profile Allows user to load the profile from saved profiles and shows last loaded profile</p>



Menu Item	Menu Sub-items	Description
	Link Test	Allows user to do a throughput test and ping test. These tools could be very helpful during the installation phase.
	Link Budget Planning Calculator	Allows user to calculate the Link Budget.
	Antenna alignment	Shows the link status, link quality, RSSI.
	Site Survey	Shows all the wireless devices operating in the area.
	User Manager	Allows the administrator to change the Administrator password.
	Firmware Upgrade	Allows user to update to new firmware versions.
<b>Help</b>	Technical Support	Information on Technical Support
	User Guide – Online	Links to online User Guide
	Product Registration and Feedback	Allows user to register product and provide feedback or suggestions.
	Check for Updates	Check on smartBridges website for any software updates.
	About airClient Nexus	General system description, software version information and warranty information.

## 2.4. Device Mode Configuration

The device operational mode is displayed at the top right hand corner of each page. The Device Mode Configuration allows the user to configure the airClient in NAT, Router or Bridge mode.

**NAT:** This is the default operating mode. This mode allows a Local Area Network (LAN) to use one set of IP addresses for internal traffic and a single wireless IP for external traffic. This provides a type of firewall by hiding internal IP addresses and allows sharing by many computers behind the airClient. Since these are done in the LAN there is no possibility of conflict with IP addresses in the public or wireless network.  
This is in the Client Infrastructure mode.

**Router:** A normal routing functionality is provided in this mode. This is in Client Infrastructure mode.

**Bridge:** A transparent bridging functionality is provided in this mode which uses WDS implementation.

System Configuration :
airClient (sB3410) - NAT mode

System Configuration	
System Name	Nexus
System Description	Nexus
SNMP Security	<a href="#">SNMP Security</a>
Reset	<a href="#">Reset</a>
Delayed Reset	<a href="#">Delayed Reset</a>
NTP Server	<a href="#">NTP Server Settings</a> <a href="#">Time Server Not available</a>
Firmware Version	v1.00.02 <a href="#">Release Notes</a>
Radio Firmware Version	1.1.2.16
Edit Configuration	<a href="#">IP Configuration</a> <a href="#">Radio</a> : <a href="#">Performance</a> <a href="#">Data Encryption</a>
Reset To Factory Defaults	<a href="#">Reset To Defaults</a>
Ethernet MTU Size	1512 bytes
Syslog server IP Address	0.0.0.0   Log level : -
SNMP Trap server IP Address	0.0.0.0
Watch Guard	Suspended   for 6176 seconds <a href="#">Enable</a> <a href="#">Suspend</a>
LED Control	On

**Current Operational Mode**
  
☐ Bridge  
☐ Router  
☒ NAT

Figure 2- 6 Device mode settings (same for Router/NAT mode)

## 2.5. airClient Bridge to airClient Router/NAT

Follow the steps below to change airClient Bridge mode to airClient Router/NAT mode

1. Go to 'Tools | System Configuration' drop down menu. The 'System Configuration' will be displayed.
2. Click on the 'Current Operational Mode' link to go to the 'System Configuration' page. Choose 'Router' (or NAT) under the 'Remote Device' option.
3. Click on 'Apply Changes'. A confirmation pop-up window will be displayed.
4. Enter the fields for 'IP Address', 'IP Mask' and 'Gateway' for 'Ethernet Configuration' and 'Wireless Configuration'.
5. Enter the SSID and the Domain of a remote radio.
6. Click on 'Apply Changes' button to change the settings. The device will be rebooted and set to the chosen operational mode.

**Confirm Ethernet and Wireless Configuration :**

Ethernet Configuration	
IP Address	192 . 168 . 0 . 7
IP Mask	255 . 255 . 255 . 0

Wireless Configuration	
IP Address	192 . 168 . 2 . 207
IP Mask	255 . 255 . 255 . 0
Gateway	0 . 0 . 0 . 0
DHCP	<input type="checkbox"/>
SSID	NEXUS_MASTER
Domain	FCC

Apply Changes

**Figure 2-7 Changing airClient Bridge to airClient Router/NAT**

## 2.6. airClient Router/NAT to airClient Bridge

Follow the steps below to change airClient Router/NAT mode to airClient Bridge Mode

1. Go to 'Tools | System Configuration' drop down menu. The 'System Configuration' will be displayed.
2. Click on the 'Current Operational Mode' link to go to the 'System Configuration' page. Choose 'Bridge' under the 'Remote Device' option.
3. Click on 'Apply Changes'. A confirmation pop-up window will be displayed.
4. Enter the fields for 'IP Address', 'IP Mask' and Gateway for 'Ethernet Configuration'.
5. Enter the MAC address and the SSID of the remote radio.
6. Enter the Channel and Domain.
7. Click on the 'Apply Changes' button to change the settings.
8. The device will be rebooted and set to the chosen operational mode.

**Confirm Configuration :**

Wireless Configuration	
SSID	NEXUS_MASTER
MAC Address	00:30:1A:1F:4A:30
Domain	FCC
Channel	1 - (2412 MHz)

Ethernet Configuration	
IP Address	192 . 168 . 0 . 7
IP Mask	255 . 255 . 255 . 0
Gateway	0 . 0 . 0 . 0
DHCP	<input type="checkbox"/>

Apply Changes

**Figure 2-8 Changing airClient Router/NAT to airClient Bridge**

## 2.7. airClient Bridge Configuration

The airClient in Bridge mode can only associate with an airPoint™ (sB3210) in bridge mode. This Bridge mode uses WDS implementation.

The following sections outline the procedures for changing the settings for bridge mode.

### 2.7.1. Ethernet Configuration

The Ethernet IP is configured when the operational mode was changed to the bridge mode.

Follow these steps below if you need to re-configure the airClient Bridge Ethernet parameters:

1. From the 'Summary Information' page, click on the 'Ethernet Configuration' link.
2. Select DHCP enable/disable radio button. Enter the 'IP address', 'IP mask', 'Gateway' for non DHCP. Give the unit a unique IP Address in the designated IP subnet.
3. Click on the 'Apply Changes' button to effect the changes.

Home	Networking	Radio	Tools	Help	Logout
Summary Information :			airClient (sB3410) - <a href="#">Bridge mode</a>		
Wireless Configuration			Ethernet Configuration		
SSID	NEXUS_MASTER		IP Address	192.168.0.207	
Channel	4 - (2427 MHz)		IP Mask	255.255.255.0	
RSSI (dBm)	-41		Gateway	0.0.0.0	
Maximum Wireless Throughput (Kbps)	512		DHCP	Disabled	
Port Information					
ETH A MAC Address	00:30:1A:1C:3D:B7				
ETH B MAC Address	00:30:1A:1C:3D:B8				
Radio MAC Address	00:30:1A:1F:48:2B				

**Figure 2-9 airClient Bridge Ethernet Configuration**

### 2.7.2. Wireless Configuration

The wireless parameters need to be configured to allow the airClient in Bridge mode to associate with an airPoint™ (sB3210) in Bridge mode.

Follow these steps below to configure the airClient Bridge Mode wireless association parameters:

1. Select 'Main – airClient Bridge Mode' from the 'Radio' drop-down menu on the menu bar.
2. Enter the SSID and access point's radio MAC address.

3. Choose a radio regulatory domain and channel from the drop down lists.
4. Select the transmit power of the radio from the Dial-in-Power drop down menu and select the appropriate gain of the antenna
5. Enter the RF cable loss based on the cable specifications.
6. Click 'Apply Changes'. The units will attempt to associate.
7. Click on the 'View Association Table' to check for the associated clients.

Home	Networking	Radio	Tools	Help	Logout
Radio Configuration : airClient Bridge - Main			airClient (sB3410) - <a href="#">Bridge mode</a>		
<a href="#">Wireless Settings</a>					
SSID	<input type="text" value="NEXUS_MASTER"/>				
MAC Address	<input type="text" value="00:30:1A:1F:48:23"/>				
Domain	<input type="text" value="FCC"/>				
Radio Operating Mode	<input type="text" value="sB Enhanced Mode (Compression On)"/>				
Channel	<input type="text" value="4 - (2427 MHz)"/>				
Rates	<input type="radio"/> 6 Mbps <input checked="" type="radio"/> 9 Mbps <input type="radio"/> 12 Mbps <input type="radio"/> 18 Mbps <input type="radio"/> 24 Mbps <input type="radio"/> 36 Mbps <input type="radio"/> 48 Mbps <input type="radio"/> 54 Mbps				
Auto rate Fallback	<input checked="" type="checkbox"/>				
Dial a Power	<input type="text" value="18 dBm"/>	Antenna Gain (dBm):	<input type="text" value="23"/>	RF Cable Loss(dBm) :	<input type="text" value="3"/>
<a href="#">Status</a>	<input type="button" value="Apply Changes"/>				

**Figure 2-10 airClient Bridge Wireless Settings**

Click on '**Status**' to view the association link-status graph.

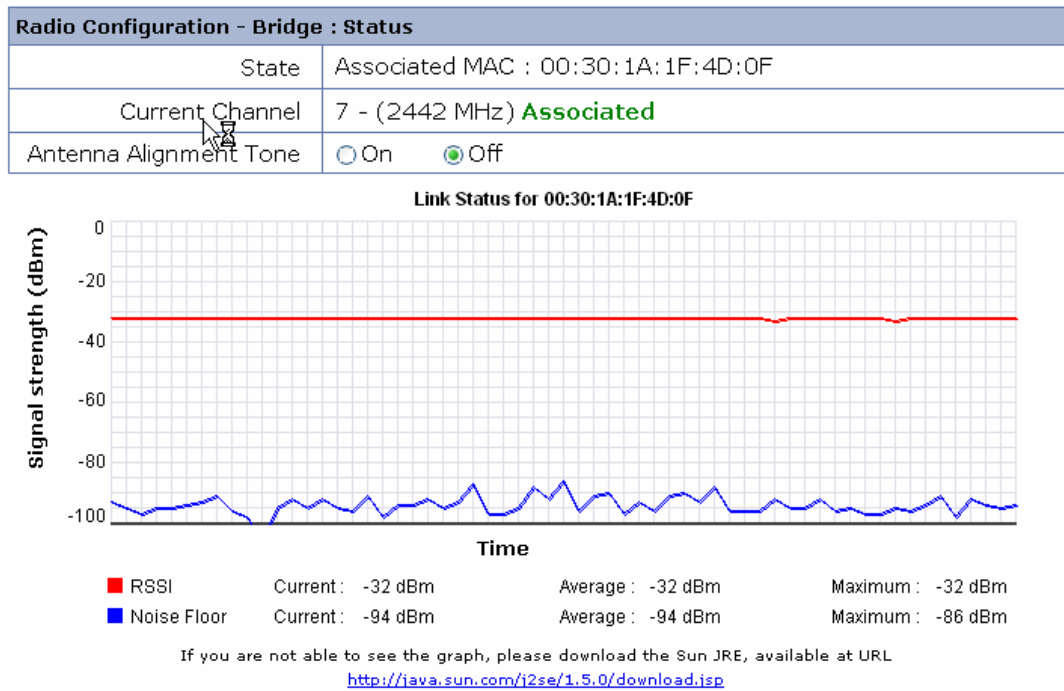


Figure 2-11 Link Status

### 2.7.3. Bridge Configuration

In Bridge mode the airClient unit acts as a transparent bridge between the Radio and the Ethernet interfaces. The figure below shows the bridge configuration and the table of bridge forwarding information. The STP (Spanning Tree Protocol) is disabled by default.

Home	Networking	Radio	Tools	Help	Logout
Networking : Bridge Configuration			airClient (sB3410) - <a href="#">Bridge mode</a>		
Bridge Configuration					
Bridge Address	00:30:1A:1C:3D:B7	Number of Ports	3		
Type of Bridging	Transparent	Spanning Tree Protocol	Disabled		
 <a href="#">Transparent Aging Time</a> : 300 (seconds)					
Forwarding Table for Transparent Bridge					
Sr.no	MAC Address	Port Number	Local?		
1	00:30:1A:1F:48:2B	3	yes		
2	00:30:1A:1C:3D:B8	2	yes		
3	00:30:1A:1C:3D:B7	1	yes		
4	00:30:1A:01:70:14	2	no		
<div>Refresh</div>					

Figure 2-12 Bridge Configuration Information

### 2.7.4. Configuring Spanning Tree Protocol (STP)

STP is a Layer 2 link management protocol that provides path redundancy while preventing loops in the network. For a Layer 2 Ethernet network to function properly, only one active path can exist between any two redundant links.

To create a fault-tolerant network, there needs to be a loop-free path between all nodes in the network. The Spanning Tree Algorithm calculates the best loop-free path throughout a Layer 2 network. Infrastructure devices such as wireless bridges and switches send and receive spanning tree frames, called Bridge Protocol Data Units (BPDUs), at regular intervals. The devices do not forward these frames but use them to construct the loop-free path.

Multiple active paths among end stations cause loops in the network. If a loop exists in the network, end stations might receive duplicate messages. Infrastructure devices might also learn end-station MAC addresses on multiple Layer 2 interfaces. Such conditions result in an unstable network.

STP defines a tree with a root bridge and a loop-free path from the root to all infrastructure devices in the Layer 2 network.

STP forces redundant data paths into a standby (blocked) state. If a network segment in the spanning tree fails and a redundant path exists, the Spanning Tree Algorithm recalculates the spanning tree topology and activates the standby path.

When two interfaces on a device are part of a loop, the spanning tree port priority and path cost settings determine which interface is put in the forwarding state and which is put in the blocking state. The port priority value represents the location of an interface in the network topology and how well it is located to pass traffic. The path cost value represents the media speed.



## 2.7.5. STP Settings Configuration

STP is disabled by default. The table below lists the default STP settings when the STP is enabled.

**Table 2-3 Default STP Values**

Setting	Default Value	Range	Purpose
<b>Bridge priority</b>	32768	0-65535	A parameter used to identify the root bridge in a spanning tree (instance of STP). The bridge with the lowest value has the highest priority and is the root.
<b>Bridge max age</b>	20	6-40	The interval a bridge will wait for a hello packet from the root bridge before initiating a topology change.
<b>Bridge hello time</b>	2	1-10	The interval of time between each configuration BPDU sent by the root bridge.
<b>Bridge forward delay</b>	15	4-30	The period of time a bridge will wait (the listen and learn period) before beginning to forward data packets.
<b>Ethernet port (ETH A) path cost</b>	100	0-65535	The cost of using the port to reach the root bridge. When selecting among multiple links to the root bridge, STP chooses the link with the lowest path cost and blocks the other paths. Each port type has its own default STP path cost.
<b>Ethernet port (ETH A) priority</b>	128	0-255	The preference that STP gives to this port relative to the other ports for forwarding traffic out of the spanning tree.  A higher numerical value means a lower priority; thus, the highest priority is 8.
<b>Ethernet port (ETH B) path cost</b>	100	0-65535	The cost of using the port to reach the root bridge. When selecting among multiple links to the root bridge, STP chooses the link with the lowest path cost and blocks the other paths. Each port type has its own default STP path cost.
<b>Ethernet port (ETH B) priority</b>	128	0-255	The preference that STP gives to this port relative to the other ports

Setting	Default Value	Range	Purpose
			for forwarding traffic out of the spanning tree.  A higher numerical value means a lower priority; thus, the highest priority is 8.
<b>Radio port (Radio A) path cost</b>	100	0-65535	The cost of using the port to reach the root bridge. When selecting among multiple links to the root bridge, STP chooses the link with the lowest path cost and blocks the other paths. Each port type has its own default STP path cost.
<b>Radio port (Radio A) priority</b>	128	0-255	The preference that STP gives to this port relative to the other ports for forwarding traffic out of the spanning tree.  A higher numerical value means a lower priority; thus, the highest priority is 8.

The Radio and Ethernet interfaces are assigned to bridge group by default. When the user enables STP and assigns a priority on bridge, STP is enabled on the radio and Ethernet interfaces. The interfaces adopt the priority assigned to bridge.

The user can edit STP Priority, Bridge Max age, Bridge hello time, Forward Delay, STP Port priority and STP Port Path cost.

The **Transparent Aging Time** determines the time to refresh entries in the Forwarding Table. The Transparent Aging Time default value is 300 seconds.

Follow the steps below to configure the bridge STP for device in airClient Bridge:

1. Click on 'Networking | Bridge Configuration' to access the Bridge Configuration page.
2. Choose 'Enable' from the Spanning Tree Protocol pull down list.
3. Click on the 'Generic Port Table' link to change the Generic Parameters.
4. Enter a value for the 'STP Priority'.
5. Enter a value for the 'Bridge Max Age'.
6. Enter a value for the 'Bridge Hello Time'.
7. Enter a value for the 'Bridge Forward Delay'.
8. Click on 'Transparent Aging Time' link to change the 'Transparent Aging Time'.
9. Click on the 'Spanning Tree Port Table' link to change the 'STP Ethernet Port' parameters.

10. Enter the values of Ethernet Port Priority and/or Port Path Cost for ETHA.
11. Enter the values of Ethernet Port Priority and/or Port Path Cost for ETHB.
12. Enter the values of Ethernet Port Priority and/or Port Path Cost for Radio A
13. Click on 'Apply Changes' Button to save to the current configuration file.

Home	Networking	Radio	Tools	Help	Logout
Networking : Bridge Configuration			airClient (sB3410) - <a href="#">Bridge mode</a>		
<b>Bridge Configuration</b>					
Bridge Address	00:30:1A:1C:3D:B7	Number of Ports	3		
Type of Bridging	Transparent	Spanning Tree Protocol	Disable <input type="button" value="v"/>		
Transparent Aging Time : <input type="text" value="300"/> (seconds)					<input type="button" value="Apply Changes"/>
<b>Forwarding Table for Transparent Bridge</b>					
Sr.no	MAC Address	Port Number	Local?		
1	00:30:1A:1F:48:2B	3	yes		
2	00:30:1A:1C:3D:B8	2	yes		
3	00:30:1A:1C:3D:B7	1	yes		
4	00:30:1A:01:70:14	2	no		
					<input type="button" value="Refresh"/>

Figure 2-13 Bridge Configuration

## 2.8. airClient Router/NAT Configuration

The airClient unit can also be configured in Router or NAT mode which behaves like Infrastructure mode. The procedures for configuring the parameters in Router mode are given below. In this mode, the units will associate with any access point.

**Note:** The configuration procedure of parameters in NAT mode is the same as for Router mode.

### 2.8.1. Ethernet Configuration

The Ethernet IP is configured during the operational mode change to airClient Router mode.

Follow these steps below if you need to re-configure the airClient Router Ethernet parameters:

1. From the 'Summary Information' page, click on the 'Ethernet Configuration' link to change Ethernet parameters.
2. Enter the 'IP address' and 'IP mask'.
3. Click on 'Apply Changes' to effect the changes.

**Summary Information :**

**airClient (sB3410) - Router mode**

**Wireless Configuration**

IP Address	192 . 168 . 1 . 3
IP Mask	255 . 255 . 255 . 0
Gateway	0 . 0 . 0 . 0
DHCP	<input type="checkbox"/>
SSID	NEXUS_MASTER
Channel	1 - (2412 MHz)
Association Status	Associated
RSSI	-81 dBm

**Ethernet Configuration**

IP Address	192 . 168 . 0 . 207
IP Mask	255 . 255 . 255 . 0

**Port Information**

ETH A MAC Address	00:30:1A:1C:43:37
ETH B MAC Address	00:30:1A:1C:43:38
Radio MAC Address	00:30:1A:1F:48:22

Apply Changes

Figure 2-14 airClient Router Ethernet Configuration

## 2.8.2. Wireless Configuration

The wireless parameters need to be configured to allow the airClient Router unit to associate with an airPoint™ or any third party access point.

Follow these steps below to configure the airClient Router/NAT Mode Wireless IP Settings parameters:

1. Click on the 'Wireless Configuration' link from the 'Summary Information' page.
2. Enter the wireless 'IP address', 'IP Mask', 'Gateway IP' address for the airClient unit.
3. Check the 'Enable DHCP' checkbox if the IP address can be obtained automatically from the wireless link.
4. Click on the 'Apply Changes' to change the settings.

**Summary Information :**

**airClient (sB3410) - [Router mode](#)**

Wireless Configuration	
IP Address	192 . 168 . 1 . 3
IP Mask	255 . 255 . 255 . 0
Gateway	0 . 0 . 0 . 0
DHCP	<input type="checkbox"/>
<a href="#">SSID</a>	NEXUS_MASTER
Channel	1 - (2412 MHz)
Association Status	<b>Associated</b>
<a href="#">RSSI</a>	-81 dBm

Ethernet Configuration	
IP Address	192 . 168 . 0 . 207
IP Mask	255 . 255 . 255 . 0

Port Information	
ETH A MAC Address	00:30:1A:1C:43:37
ETH B MAC Address	00:30:1A:1C:43:38
Radio MAC Address	00:30:1A:1F:48:22

Apply Changes

Figure 2-15 airClient Router Wireless IP Configuration

In order for the airClient Router device to associate with the access point, the user needs to configure the access point's SSID and WEP (if used).

Follow these steps below to configure the airClient Router/NAT Mode wireless association parameters:

1. Click on 'Main airClient Router Mode' from the 'Radio' drop-down menu.
2. Enter the SSID and domain.
3. Select the Transmit power of the radio from Dial in Power drop down menu.
4. Select the gain of the antenna from the drop down menu as per the gain of the antenna being used with the equipment.
5. Enter the RF cable loss based on the cable specifications.
6. Click 'Apply Changes'. The units will attempt to associate.

**Note:** Clicking on 'Status' will display further details on the association.

Home	Networking	Radio	Tools	Help	Logout
Radio Configuration : airClient Router - Main			airClient (sB3410) - Router mode		
<u>Wireless Settings</u>					
SSID	NEXUS_MASTER Associated				
Domain	FCC				
Dial a Power	18 dBm	Antenna Gain(dBm) :	23	RF Cable Loss(dBm):	3
Radio Operating Mode	Mixed (802.11 a/b/g)				
Channel	4 - (2427 MHz)				
Rates	<input type="radio"/> 1 Mbps <input type="radio"/> 2 Mbps <input type="radio"/> 5.5 Mbps <input type="radio"/> 11 Mbps <input type="radio"/> 6 Mbps <input type="radio"/> 9 Mbps <input type="radio"/> 12 Mbps <input type="radio"/> 18 Mbps <input type="radio"/> 24 Mbps <input type="radio"/> 36 Mbps <input type="radio"/> 48 Mbps <input checked="" type="radio"/> 54 Mbps				
Auto rate Fallback	<input checked="" type="checkbox"/>				
<u>Status</u>	Apply Changes				

Figure 2-16 airClient Router Wireless Association Settings

Click on 'Status' to view the association link-status graph.

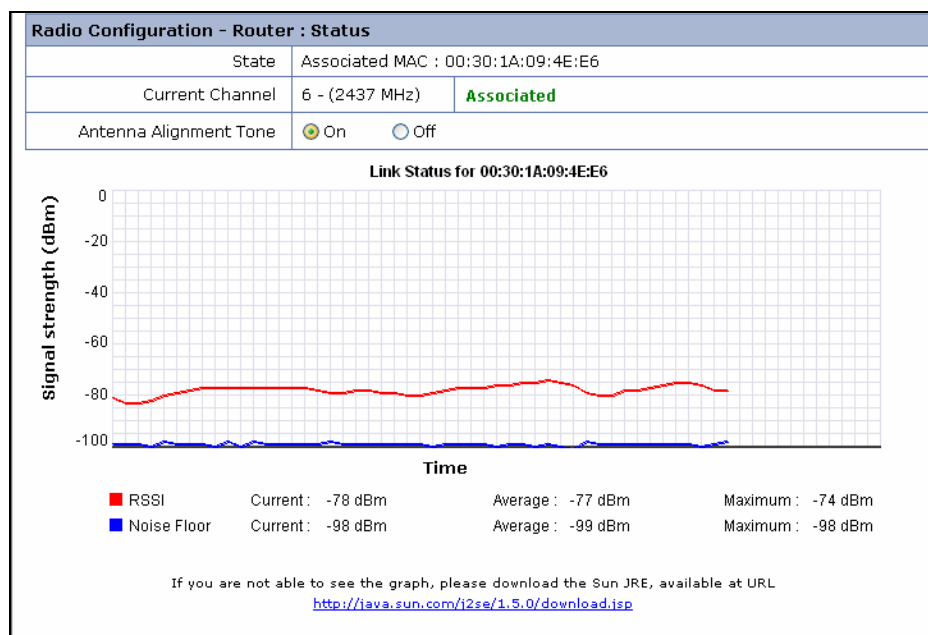


Figure 2-17 Link Status

**Note:** If the association status window does not appear, click on the Java link to download the JRE.

### 2.8.3. DHCP Configurations

The airClient Router/NAT unit can be used as a DHCP server or DHCP relay agent. DHCP (Dynamic Host Configuration Protocol) allows a host to be automatically assigned a new IP address out of a pool of IP addresses for his network.

A DHCP server/relay can only be configured when the device is in the airClient Router/NAT Mode.

Follow the steps below to configure the airClient Router unit as a DHCP server:

1. Click on 'Networking' | 'DHCP Server' from the menu bar to access the DHCP configuration page.
2. Click on 'Enable DHCP' to start the DHCP server configuration.
3. Enter the starting IP address for the IP pool range that can be assigned to a DHCP client.
4. Enter the Max number of users for the maximum number of clients which can be assigned an IP address at a time by the DHCP server.
5. Enter Max Lease Time in Days, Hours and Minutes for all the clients.
6. Enter DNS Server IP address(es).
7. Click on the 'Apply Changes' to change the settings.

**Note:** The system will validate the input parameters and notify users of invalid entries.  
 The Starting IP address will be in the same network segment as the device wired-side Ethernet IP address.  
 IP address 0.0.0.0 for the DNS Server IP indicates no DNS Server is being used.  
 The DHCP Server is only available to hosts connected to the same LAN segment as the device wired-side Ethernet port.

Home	Networking	Radio	Tools	Help	Logout
Networking : DHCP Server Configuration			airClient (sB3410) - <a href="#">Router mode</a>		
<b>DHCP Server Configuration</b>					
DHCP	<input checked="" type="radio"/> Enable DHCP Server <input type="radio"/> Enable DHCP Relay <input type="radio"/> Disable DHCP and DHCP Relay				
Starting IP Address	192.168.2. <input type="text" value="0"/>				
Max number of users	<input type="text" value="20"/>				
Max Lease Time	Days : <input type="text" value="0"/> Hours : <input type="text" value="02"/> Minutes : <input type="text" value="00"/>				
DNS Server IP	<input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>				
Secondary DNS Server IP	<input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/> . <input type="text" value="0"/>				
<a href="#">Apply Changes</a>					

**Figure 2-18 DHCP Server Configurations**

Follow the steps below to disable the airClient Router/NAT DHCP server:

1. Click on 'Networking' | 'DHCP Server' from the menu bar to access the DHCP configuration page.
2. Click on 'Disable DHCP and DHCP Relay' to disable the DHCP server configuration.
3. Click on the 'Apply Changes' to change the settings.

Home	Networking	Radio	Tools	Help	Logout
Networking : DHCP Server Configuration			airClient (sB3410) - <a href="#">Router mode</a>		
<b>DHCP Server Configuration</b>					
DHCP		<input type="radio"/> Enable DHCP Server	<input type="radio"/> Enable DHCP Relay	<input checked="" type="radio"/> Disable DHCP and DHCP Relay	
					<input type="button" value="Apply Changes"/>

Figure 2-19 Disable DHCP and DHCP Relay

## 2.8.4. DHCP Relay Configurations

If the user has a DHCP Server, the airClient Router can be configured as a DHCP Relay agent of the DHCP Server for IP address assignment.

Follow the steps below to configure the airClient Router unit as a DHCP Relay Agent:

1. Click on 'Networking' | 'DHCP Server' from the drop down menu to access the DHCP Configuration page.
2. Click on 'Enable DHCP Relay' to choose DHCP Relay mode.
3. Enter a valid DHCP Server IP.
4. Click on the 'Apply Changes' to start the DHCP relay agent.

**Note:** The system will validate the input parameters and notify users of invalid entries.  
 The DHCP Server IP will be in the same network segment as the device wireless Radio IP address.  
 The DHCP Server needs to be configured to serve IP range of the wired side Ethernet IP.  
 The DHCP Relay Agent is only available to hosts connected to the same LAN segment as the device wired-side Ethernet port.



Home	Networking	Radio	Tools	Help	Logout
Networking : DHCP Server Configuration			airClient (sB3410) - <a href="#">Router mode</a>		
<b>DHCP Server Configuration</b>					
DHCP <input type="radio"/> Enable DHCP Server <input checked="" type="radio"/> Enable DHCP Relay <input type="radio"/> Disable DHCP and DHCP Relay					
<b>DHCP Relay Agent</b>					
DHCP Server IP <input type="text" value="192"/> . <input type="text" value="168"/> . <input type="text" value="1"/> . <input type="text" value="2"/>					
<a href="#">Apply Changes</a>					

Figure 2-20 DHCP Relay Agent Configurations

## 2.8.5. Routing Table

The airClient Router web-interface provides viewing of the routes and allows for adding and deleting of the static routes for the airClient Router mode only.

To view the route entry in the airClient Router device, click on 'Networking' | 'Routing Table' from the menu bar to access the view routing table page.

Networking : Routing Table		<a href="#">Operational mode : airClient Router</a>	
<b>Routing Table</b>			
Destination	Gateway	Mask	Flags Metric Interface Type
192.168.1.0	*	255.255.255.0	U 0 Wireless D
192.168.0.0	*	255.255.255.0	U 0 Ethernet D
224.0.0.0	*	240.0.0.0	U 0 Ethernet D
<a href="#">Refresh</a>			
<b>Add Static Route</b>			
Network IP Address	<input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/>	Gateway	<input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/>
Mask	<input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/>	Interface	<input type="text" value="—Select—"/>
Metric	<input type="text" value=""/>	<a href="#">Apply Changes</a>	
Flags : <b>U</b> - route is up <b>H</b> - target is a host <b>G</b> - use gateway <b>R</b> - reinstate route for dynamic routing <b>A</b> - installed by addrconf <b>C</b> - cache entry <b>!</b> - reject route Type : <b>D</b> - Dynamic Route <b>S</b> - Static Route			

Figure 2-21 Routing Table

Follow the steps below to add a static route entry in the airClient Router device.

1. Click on 'Networking' | 'Routing Table' from the menu bar to access the view routing table page.

2. Enter the Network IP, Mask, Gateway, Interface and Metric entry for the new route.
3. Click on 'Apply Changes' to add the new static route.

Follow the steps below to delete a static route entry in the airClient Router device.

1. Click on 'Networking' | 'Routing Table' from the menu bar to access the view routing table page.
2. Click on 'Del' on the right hand side of the route entry to be deleted.
3. Click on 'Apply Changes' to delete the route.

**Note:** Only static route can be deleted.

Networking : Routing Table
[Operational mode : airClient Router](#)

Routing Table							
Destination	Gateway	Mask	Flags	Metric	Interface	Type	
192.168.3.1	192.168.1.10	255.255.255.255	UGH	1	Ethernet	S	<a href="#">Del</a>
192.168.3.0	*	255.255.255.0	U	0	Wireless	D	
192.168.3.0	192.168.1.10	255.255.255.0	UG	4	Ethernet	S	<a href="#">Del</a>
192.168.1.0	*	255.255.255.0	U	0	Ethernet	D	

Please wait while your request is in progress [Refresh](#)

Add Static Route

Network IP Address	<input type="text" value="192"/> . <input type="text" value="168"/> . <input type="text" value="3"/> . <input type="text" value="0"/>	Gateway	<input type="text" value="192"/> . <input type="text" value="168"/> . <input type="text" value="1"/> . <input type="text" value="10"/>
Mask	<input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="255"/> . <input type="text" value="255"/>	Interface	<input type="text" value="Ethernet"/>
Metric	<input type="text" value="12000000"/> <a href="#">Apply Changes</a>		

Flags : **U** - route is up  
**G** - use gateway  
**A** - installed by addrconf  
**!** - reject route  
Type : **D** - Dynamic Route

**H** - target is a host  
**R** - reinstate route for dynamic routing  
**C** - cache entry  
**S** - Static Route

Figure 2-22 Adding Static Route

## 2.9. Wireless Settings Management

The Radio Configuration Main page can be accessed from the **Radio** menu. The contents will be slightly different for each mode, Bridge, Router or NAT.

Radio Configuration : airClient Bridge - Main

airClient (sB3410) - [Bridge mode](#)

Wireless Settings				
SSID	aC_Demo Associated			
MAC Address	00:30:1A:1F:4D:0F			
Domain	FCC			
Radio Operating Mode	Mixed (802.11 a/b/g)			
Channel	7 - (2442 MHz)			
Rates	1 Mbps 6 Mbps 24 Mbps	2 Mbps 9 Mbps 36 Mbps	5.5 Mbps 12 Mbps 48 Mbps	11 Mbps 18 Mbps 54 Mbps
Auto rate Fallback	Enabled			
Dial a Power	18 dBm	Antenna Gain (dBm):23	RF Cable Loss(dBm) :3	
Status				

### 2.9.1. Wireless Settings

The following table summarizes the information for the wireless settings.

**Table 2-3 Wireless Settings**

Page Items	Descriptions
<b>SSID</b>	This is the current SSID.  User can change the SSID. The SSID is a unique identifier that wireless networking devices use to establish and maintain wireless connectivity. It is case sensitive and can contain up to 32 alphanumeric characters. Do not include special characters in the SSID.
<b>Mac Address</b>	When in airclient Bridge mode, this is the Radio MAC address of the Root Device
<b>Domain</b>	This is the current radio regulatory domain.  User can choose the appropriate domain. The pull-down menu shows a list of domains supported by radio. Different domains will show different channel lists.
<b>Radio Operating mode</b>	sB Enhanced Mode gives better performance with the compression ON. For this reason, it does not support 802.11b and third party access point.

Page Items	Descriptions
<b>Channel</b>	This is the current radio channel in the selected domain.  This is settable when in airClient Bridge mode, user need to enter the same channel as the Root device from the pull-down list. The radio channel settings correspond to the frequencies available in the user regulatory domain.
<b>Rates</b>	This indicates the current rate at which the radio is operating, which can be set as desired by the user.
<b>Auto Rate Fallback</b>	Allows radio to fall back to lower data rate.
<b>Dial a Power</b>	Dial a Power is used to set the output power of the radio at the N Connector. The valid radio power range is from -5 dBm to 23 dBm
<b>Antenna Gain</b>	This is a gain of an antenna attached with the airHaul unit. The gain input here is merely for the purpose of display and calculation of the EIRP.  User can select anywhere between 2.2dBi to 30 dBi.
<b>RF cable Loss</b>	This refers to the loss of a cable connecting antenna to the airHaul unit
<b>Status</b>	Display associated link status.

### 2.9.2. Data Encryption

Wireless Equivalent Privacy (WEP) encryption is used for security between the airClient and the airPoint or any other access point radio. To enable/disable WEP or change the relevant settings, you need to access the encryption setting page on the web interface. The following table describes the information for the Data Encryption.

**Table 2-4 Data Encryption Settings**

Page Items	Descriptions
<b>Authentication</b>	Select authentication method between open system and shared key  <u>Open system</u> : Open System is null authentication. With WEP enabled and valid WEP key on both ends, it provides data encryption. Clients without correct WEP key still can associate but can not send packet through.  <u>Shared key</u> : Strict authentication for both authentication and data encryption. Clients must provide valid WEP key to associate
<b>WEP</b>	Enable /Disable WEP Encryption
<b>WEP Key Type</b>	HEX
<b>WEP Key Size</b>	Choose encryption key size between 64bits and 128bits  <u>64 bits</u> : User has to input 10 HEX digits.

Page Items	Descriptions
	<p><u>128 bits</u>: User has to input 26 HEX digits.</p> <p>Note: When key size is changed, all 4 keys are lost and user needs to re-enter.</p>
<b>Valid Key</b>	Choose which key in key table is used for authentication: 1 – 4 This value must be matching between the airClient and access point.
<b>Key Table</b>	Display / Set WEP keys A maximum of four keys can be set.

Follow the steps below to configure the Data Encryption parameters.

1. Click the 'Data Encryption' link from the 'Radio Main' page.
2. Click the 'Enable' button on the WEP.
3. Choose the Authentication as 'Open System' or 'Shared Key' by clicking on the radio button.
4. Choose a WEP Key Size (64 Bits or 128 Bits) from the pull-down list. WEP key length is 10 characters for 64 Bits and 26 characters for 128 Bits.
5. Choose a Valid Key from the pull-down list.
6. Enter the WEP key in the Key Table entries.
7. Click the 'Apply Changes' button to change the settings.

**Note:** The system will validate the key entries and provide error or warning notifications.  
The user must enter the key indicated by the Valid Key selection.

Data Encryption			
WEP	<input type="radio"/> Disable <input checked="" type="radio"/> Enable		
Authentication	<input type="radio"/> Open System <input checked="" type="radio"/> Shared Key		
Wep Key Type	HEX	Wep Key Size	128 Bits ▼
Valid Key	Second Key ▼		
Key Table			
First Key	1236789abc4501de789456f123	Second Key	1267def123345456789abc8901
Third Key	12345abcdef123456789016789	Fourth Key	12343def178456789562abc901
<input type="button" value="Apply Changes"/>			

**Figure 2-23 Data Encryption Configuration**

Follow the steps below to disable the Data Encryption:

1. Click the '**Data Encryption**' link from the 'Radio Main' page.
2. If it is in **Shared key** mode, please set to **Open System** before you can click Disable
3. Click the 'Disable' button on the WEP.
4. Click the 'Apply Changes' button to change the settings.



The screenshot shows a web interface for 'Data Encryption'. It has a blue header bar with the title 'Data Encryption'. Below the header, there is a section for 'WEP' with two radio buttons: 'Disable' (which is selected) and 'Enable'. At the bottom right of the form, there is a button labeled 'Apply Changes'.

Figure 2-24 Data Encryption Disable

### 3. Performance Parameters and Bandwidth Controller

This chapter gives instructions for editing the wireless radio protocol parameters to optimize radio performance and changing the Bandwidth Controller. These procedures are the same for all the three modes.

#### 3.1. Link Performance Parameters and Features

The radio protocol parameters are:

- 1) Fragment Length (between 256 and 2346)
- 2) RTS/CTS (between 256 and 2346)
- 3) RSSI Threshold (between -90 and -20)
- 4) Preamble settings: Long, Short or Dynamic
- 5) Throughput Optimizer

**Table 3-1 Radio Performance Parameters**

Page Item	Descriptions
<b>Fragment Length</b>	<p>a) Show current value b) Change to a value within its range</p> <p>This setting determines the size at which packets are fragmented. If the frame that the access point is transmitting is larger than the threshold, it will trigger the fragmentation function.</p> <p>The use of fragmentation can increase the reliability of frame transmissions. Because smaller frames are being sent, collisions are much less likely to occur.</p> <p>The range of its value is from 256 to 2346. The default value is 2346 bytes.</p>
<b>RTS/CTS Length</b>	<p>a) Shows current value b) Change value</p> <p>RTS: <u>R</u>equ<u>e</u>st <u>T</u>o <u>S</u>end                      CTS: <u>C</u>lear <u>T</u>o <u>S</u>end</p> <p>The RTS/CTS length determines the packet size at or larger than the set value. The radio issues a request to send (RTS) before sending the packet.</p> <p>The primary reason for implementing RTS/CTS is to minimize collisions among the hidden stations.</p> <p>The range of its value is from 256 to 2346. The default value is 2346 bytes.</p>
<b>RSSI Threshold</b>	<p>This function provides better performance in higher noise area. The device will ignore any signal below the set RSSI threshold.</p> <p>The default value is -90. The range of its value if from -90 to -20.</p>
<b>Preamble Settings</b>	<p>a) Shows current value b) Choose other settings available from pull-down menu</p> <p>The radio preamble is a section of data at the head of a packet that contains information the airPoint™ Device and remote devices need when sending and receiving packets.</p>

Page Item	Descriptions
	<p>The pull-down menu allows the user to select a long, short or dynamic radio preamble. The default is dynamic.</p> <p>Long: a long preamble ensures compatibility with most clients.</p> <p>Short: a short preamble improves throughput performance. But only allow short preamble capable clients to associate.</p> <p>Dynamic: a dynamic preamble allows mixing of short and long preamble.</p>
<b>Throughput Optimizer</b>	<p>The Throughput Optimizer is used to optimize the radio Link speed and performance.</p> <p>The Valid range is 0 to 10. The default value is 6.</p> <p>Setting a higher value will cause the radio to attempt to establish at the highest possible data rate in an aggressive way. A smaller "Throughput Optimizer" value means a more stable link.</p> <p><b>Note:</b> The default value for the Throughput Optimizer is 6. Vary the Throughput Optimizer settings to achieve a more stable link.</p>

Follow the steps below to change the performance parameters:

1. From the 'Radio Configuration' page click on the 'Performance' link.
2. Enter the 'Fragment Length', 'RTS/CTS Length' and RSSI Threshold in the appropriate boxes.
3. Select throughput from 'Throughput Optimizer'.
4. Click on the 'Apply Changes' button to effect the changes.

<u>Performance</u>	
Fragment Length (256 - 2346)	2346
RTS / CTS Length (256 - 2346)	2346
RSSI Threshold	-90
Preamble Settings	Long
Throughput Optimizer (0 - 10)	6

**Figure 3-1 airClient Bridge Performance Settings**



### 3.2. Bandwidth Controller

Using the Bandwidth Controller on the airClient, the user can limit the wireless link bandwidth for the the upload/download speed. The default is disable with default upload speed of 512kbps and download speed of 6Mbps. This is subject to the available upstream bandwidth, signal level and distance..

The user can key in the upload and download bandwidth for the wireless link.

Follow the steps below to change the bandwidth parameters:

1. From the menu bar click on '**Networking | Bandwidth Controller**' drop down menu item.
2. Click on the Bandwidth Controller '**Enable**' radio button.
3. Enter the desired value for upload and download.
4. Click on the '**Apply Changes**' button to effect the changes.

Home	Networking	Radio	Tools	Help	Logout
Bandwidth Control	Bridge Configuration	airClient (sB3410) - <a href="#">Bridge mode</a>			
	Traffic Statistics				
	Bandwidth Controller				
Bandwidth Controller : <input checked="" type="radio"/> Enable <input type="radio"/> Disable					
Upload (Kbps)		Download (Kbps)			
<input type="text" value="512"/>		<input type="text" value="2560"/>			
<input type="button" value="Apply Changes"/>					

Figure 3-2 airClient Bandwidth Controller

## 4. Site Survey Tool

To access the Site Survey page, go to the 'Tools' | 'Site Survey' drop down menu. The following figure shows the list of SSID from the site survey.

BSS List					
rows indicate airPoint devices					
Sr.no	MAC Address	Channel/Freq	RSSI(dBm)	SSID	
1	00:30:1A:0C:4C:75	6 - (2437 MHz)	-72	Res_AP	<input type="radio"/>
2	00:30:1A:0C:4C:76	6 - (2437 MHz)	-73	VoIP_AP	<input type="radio"/>
3	00:30:1A:07:A1:19	8 - (2447 MHz)	-81	RoofTop	<input type="radio"/>
4	00:30:1A:09:4E:E6	6 - (2437 MHz)	-74	airPoint-PROOutdoor	<input type="radio"/>
5	00:02:8A:42:2D:2B	9 - (2452 MHz)	-80	Cisco1100	<input type="radio"/>
					Associate
Current Configuration					
SSID		airPoint-PROOutdoor			
					Refresh

(Data will refresh automatically after every 30 seconds)

**Figure 4-1 Site Survey showing associated devices**

To associate to a particular SSID, click the 'Associate' button to establish the wireless link to the access point. If WEP is used on the access point, then WEP needs to be enabled and the WEP key defined prior to association.

## 5. Antenna Alignment

Antenna alignment can be used to optimize the radio performance and check the RSSI and Noise Floor. To access the antenna alignment, go to the menu bar under **Tools** and choose '**Antenna Alignment**'. In order to view this information (Link Status), from the Radio page, use the Wireless Settings to associate the airClient with an access point.

Click on the '**Status**' link to go to the Antenna Alignment page. The Link Status page will be displayed as below.

RSSI Audio Tones are provided to help the user to align the antenna without looking at the link status display. Click on the '**Antenna Alignment Tone**' to ON button to hear the alignment tones. You will need to insert the earphones provided into the earphone jack in the unit. For more information on antenna alignment, please refer to the Quick Installation Guide.

To perform the antenna alignment:

1. Go to the menu bar and choose '**Radio**' menu item.
2. From the Radio page, use the Wireless Settings to associate the airClient with a root device or access point.
3. Click on the '**Status**' link to go to the Antenna Alignment page. The Link Status page will be displayed as below.
4. Insert the earphones into the audio jack.
5. A set of tones are provided to help the user align the antenna without looking at the link status display. Click on the '**Antenna Alignment Tone**' to ON button to hear the alignment tones.

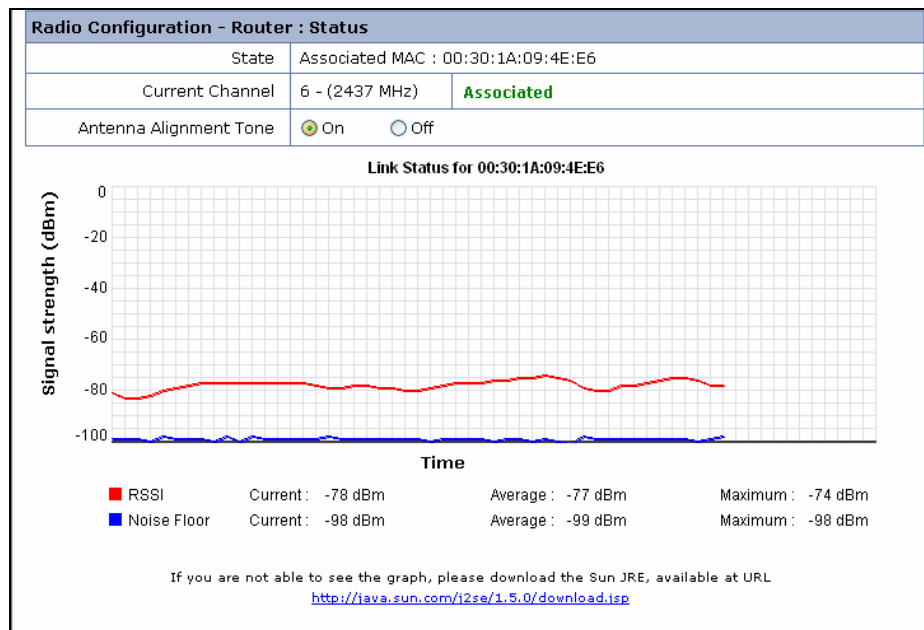


Figure 5-1 Antenna Alignment

**Note:** A jump in the audio frequency from low to high indicates that the RSSI is increasing and vice versa.

## 6. Traffic Statistics

Wireless and Ethernet Traffic Statistics can be displayed by clicking on the 'Networking' | 'Statistics' drop down menu. The following figure shows the statistics page. This page is refreshed after every 10 seconds.

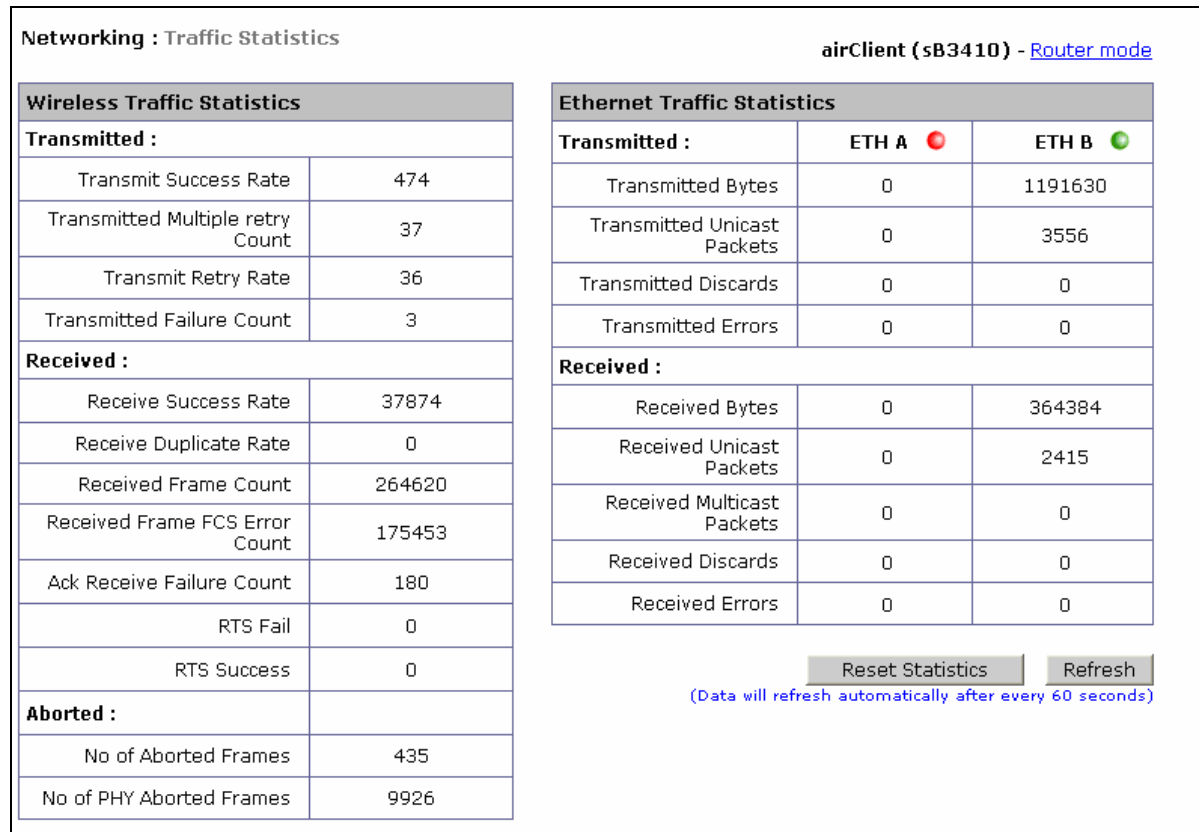


Figure 6-1 Traffic Statistics

Table 6-1 Ethernet Traffic Statistics

Ethernet Traffic Statistics	
<b>Transmitted Bytes</b>	Total No of packets transmitted from the particular interface
<b>Transmitted Unicast packets</b>	Total number of packets transmitted to a specified destination
<b>Transmitted Discards</b>	<p>No of packets dropped because of congestion or an error along the path</p> <p>In most cases, packet loss is due to network congestion. Packets are discarded to avoid the very large delays that can arise when too much traffic is queued up.</p>

Ethernet Traffic Statistics	
<b>Transmitted error</b>	No of packets discarded because of format error
<b>Received Bytes</b>	Total No of packets received through the particular interface
<b>Received Unicast packets</b>	Total No of packets received with a specified destination.
<b>Received Multicast Packets</b>	Total No of packets received with a specified destination.
<b>Received Discards</b>	No of packets discarded due to resource limitation
<b>Received Errors</b>	No of packets discarded because of form at error

The wireless statistics is also available from the 'Radio Configuration' Main Page.

Wireless Traffic Statistics			
Transmitted :		Received :	
Transmit Success Rate	2528	Receive Success Rate	26
Transmitted Multiple retry Count	0	Receive Duplicate Rate	0
Transmit Retry Rate	0	Received Frame Count	27
Transmitted Failure Count	0	Received Frame FCS Error Count	6
Aborted :		Ack Receive Failure Count	0
No of Aborted Frames	1	RTS Fail	0
No of PHY Aborted Frames	2	RTS Success	0
<div>Refresh</div> <div>(Data will refresh automatically after every 10 seconds)</div>			

**Figure 6-2 Wireless Statistics from Radio Main Page**

**Table 6-2 Wireless Traffic Statistics**

Wireless Traffic Statistics	
<b>Transmit Success Rate</b>	No of successfully transmitted unicast and multicast MPDU's.
<b>Transmit Multiple retry</b>	No of unicast MPDU's successfully transmitted after two or more retries.
<b>Transmit Retry rate</b>	No of unicast MPDU's successfully transmitted after one retry.
<b>Transmitted Failure count</b>	No of unicast MPDU's for which the maximum number of retries were exceeded.
<b>Received Success Rate</b>	No of successfully received unicast MPDU's
<b>Received Duplicate Rate</b>	No of successfully received unicast MPDU's that were a duplicate of earlier frames.

Wireless Traffic Statistics	
<b>Received Frame FCS Error Count</b>	No of unsuccessfully received frames
<b>ACK Receives Failure Count</b>	No of frame transmissions for which an acknowledgement response frame was expected but not received.
<b>RTS Fail</b>	No of transmitted RTS frames for which no response CTS frame was received.
<b>No of Aborted Frames</b>	No of frames that are aborted by the radio. An aborted frame occurs when it experiences a brief or permanent internal error that interrupts the transmission of the frame.
<b>No of PHY Aborted Frames</b>	No of PHY aborted frames when Imac drops frames. This can happen only when PLCP checksum failure occurs.

**Note:** The wireless statistics is also accessible from the 'Radio Configuration' bottom page.

## 7. Tools

Here you will find the relevant information for conducting the different reset options, using the Profile Manager and doing a Link Test as well as estimating the Link Budget.

### 7.1. System Configuration

The System Configuration page provides a one page tool to configure the airClient device. To access the System Configuration page go to 'Tools' | 'System Configuration' drop down menu. The following figure displays the System Configuration page.

System Configuration :
airClient (sB3410) - [Bridge mode](#)

System Configuration	
System Name	Nexus
System Description	Nexus
SNMP Security	<a href="#">SNMP Security</a>
Reset	<a href="#">Reset</a>
Delayed Reset	<a href="#">Delayed Reset</a>
NTP Server	<a href="#">NTP Server Settings</a> <a href="#">Time Server Not available</a>
Firmware Version	v1.00.02 <a href="#">Release Notes</a>
Radio Firmware Version	1.1.2.16
Edit Configuration	<a href="#">IP Configuration</a> Radio : <a href="#">Performance</a> <a href="#">Data Encryption</a>
Reset To Factory Defaults	<a href="#">Reset To Defaults</a>
Ethernet MTU Size	1512 bytes
Syslog server IP Address	0.0.0.0 Log level : -
SNMP Trap server IP Address	0.0.0.0
Watch Guard	Suspended for 7106 seconds <a href="#">Enable</a> <a href="#">Suspend</a>
LED Control	On

Current Operational Mode

☒ Bridge
☐ Router
☐ NAT

Figure 7-1 System Configuration



The following page summarizes the page contents of the System Configuration page.

**Table 7-1 System Configuration Page Items**

Page Item	Descriptions.
<b>System Name</b>	Displays name of airClient unit Allows user to change airClient unit name
<b>System Description</b>	Displays description of airClient unit Allows user to change airClient unit description
<b>SNMP Security</b>	Access the SNMP security settings
<b>Reset</b>	Reset device
<b>Reset To Factory Defaults</b>	Reset device to factory defaults
<b>Delayed Reset</b>	Schedule a reset
<b>NTP Server</b>	NTP server setup, as well as NTP time if server is setup
<b>Software Version</b>	Display the installed firmware version
<b>Radio Firmware Version</b>	Display the installed radio firmware version
<b>Edit Configuration</b>	Provide links to edit IP, radio, configurations
<b>Ethernet MTU Size</b>	Set the Ethernet MTU Size
<b>Syslog server IP Address</b>	Display the current message Syslog server IP Address. User can change the IP address.
<b>SNMP Trap IP</b>	Display the current SNMP trap IP address. User can change the IP address.
<b>Log Level</b>	Display the current Log Level
<b>Watch Guard</b>	Suspends/Enables the radio defenders.  If the Watch Guard is Suspended the defenders will stop for 2 hours and start again thereafter.  If the Watch Guard is enabled the radio defender's will start immediately.  <b>Note:</b> The Radio Defenders will monitor the Wireless Association Status (automatically) and traffic and take corrective action if needed.
<b>LED Control</b>	Display the current led on status. User can change the LED status to on/off
<b>Current Operational mode</b>	Display the current operational mode. User can change the current operational mode.

### 7.1.1. SNMP Security

The user can edit the SNMP Community String and SNMP Access filters. The SNMP community needs to match with the SNMP monitoring software used. The SNMP Access Filters allows you to determine which host(s) is authorized to monitor the device using SNMP. It is recommended that you set this for security reason and to prevent an attack. To change the SNMP security settings, click on the SNMP security link in the System Configuration page. Figure 7-2 shows the SNMP Security Configuration page.

Follow the steps below to change the SNMP security settings.

1. Enter New Community and Confirm Community with the same string.
2. Check the 'SNMP Access Filters' Enable box.
3. Enter Access Filters IP Address and Mask. Up to three IP's settings can be entered.
4. Click the 'Apply Changes' button.

**System Configuration : SNMP Security**
airClient (sB3410) - [Router mode](#)

---

**SNMP Security**

SNMP Community :

New Community :

Confirm Community :

**SNMP Access Filters** ☒ Enable

1) IP :  .  .  .

Mask :  .  .  .

2) IP :  .  .  .

Mask :  .  .  .

3) IP :  .  .  .

Mask :  .  .  .

**Figure 7-2 SNMP Security Configuration**

**Table 7-2 Description of SNMP Page Items**

Page Items	Descriptions
<b>SNMP Community</b>	Display SNMP Community String that is currently used to communicate to the device through SNMP
<b>New Community</b>	User can change the SNMP Community String by entering a new Community string
<b>Confirm Community</b>	User must enter the same community string as New Community string to confirm.
<b>Access Filters</b>	Display the Current Access Filter status User can change the Access Filter status.
<b>IP</b>	List of 3 IP filters. User can enter the IP address and mask.

### 7.1.2. Reset Options

All reset options power cycles the device and restarts the whole system.

**Reset:** To reset the device. The device will reboot with the current configuration/values.

**Reset to Defaults:** To reset the device to factory default configuration values.

**Delayed Reset:** To reset the device at a particular time and can be programmed to do so on a daily/weekly/monthly basis. The current time can be set by specifying a NTP server

(there is one already specified by default) and the time zone. After enabling the delayed reset, specify a time which is valid in reference to current time. When recurrence is set to weekly, monthly or daily, the reference is made with the first set time i.e. Reset time.

Tools : Delayed Reset
airClient (sB3410) - [Bridge mode](#)

[Delayed Reset](#)
☐ Disable Delayed reset

(dd-mm-yyyy)
Reset time :

Hour : 
Minutes :

Recurrence : 
☐ Daily
☐ Weekly
☐ Monthly
☒ Only once

[NTP Server Settings](#)

IP address of the NTP server	128.250.36.2
Time Zone	(GMT+08:00)Kuala Lumpur,Singapore
Current Time	<a href="#">Time Server Not available</a>

**Figure 7-3 Delayed Reset Settings**

For delayed reset, follow the steps below:

1. Select date from the calendar that has been provided.
2. Select the recurrence.
3. Click 'Apply Changes' button to change the settings.
4. To disable 'Delayed Reset', check the box provided.

### 7.1.3. NTP Time Server Setup

The device time comes from the network time information source. The device needs access to a network timer (NTP time server) source. The NTP time server IP can be configured as follows:

1. From the 'System Configuration' page, click on the 'NTP Server Setting' link.
2. A 'Time Settings' page will be displayed. Click on the 'NTP Server Settings' link to enable timer settings input.
3. Enter a valid NTP server IP address and select the Time Zone. The default NTP server is 128.250.36.2 and the default Time Zone is Singapore.
4. Click on the 'Apply Changes' button to configure the NTP. The network time will appear on the browser if NTP server is contactable.

**Note:** Please ensure that the NTP server IP is accessible from the device. Use the ping test tool from the 'Tools | Link Test' to check if the NTP server can be pinged from the device. The device can still operate without the Time Server configuration but you will not be able to perform the Delayed Reset function.

The screenshot shows the 'Tools : Time Settings' window for 'airClient (s83410) - Bridge mode'. It features a section titled 'NTP Server Settings' with three input fields: 'IP address of the NTP server' (128 . 250 . 36 . 2), 'Time Zone' (a dropdown menu showing '(GMT+08:00)Kuala Lumpur, Singapore'), and 'Current Time' (a text field showing 'Time Server Not available'). An 'Apply Changes' button is located at the bottom right of the settings area.

Tools : Time Settings		airClient (s83410) - <a href="#">Bridge mode</a>
<b>NTP Server Settings</b>		
IP address of the NTP server	128 . 250 . 36 . 2	
Time Zone	(GMT+08:00)Kuala Lumpur, Singapore ▼	
Current Time	Time Server Not available	
<a href="#">Apply Changes</a>		

**Figure 7-4 NTP Time Settings**

## 7.2. Profile Manager

The airClient Nexus configuration parameters can be saved as profiles in the system. There are four profiles available in the system:

1. Installation profile
2. Profile1
3. Profile1
4. Profile3

All the four profiles contain the same default parameters. You can save the current configurations to any of the four profiles and re-load the profiles later on or create different configurations and save them under different profiles. These can be loaded at different times based on a pre-defined calendar schedule.

The Profile Manager Configuration page can be accessed from the navigation menu bar 'Tools | Profile Manager' dropdown menu. The following figure displays the Profile Manager page.

Home	Networking	Radio	Tools	Help	Logout
Tools : Profile Manager			airClient (sB3410) - <a href="#">Router mode</a>		
<b>Save Profile</b>					
Save As: <input type="text" value="Installation Profile"/>		Profile Description : <input type="text" value="Easy Link Installation"/>			
					<input type="button" value="Save Profile"/>
<b>Profile Table :</b>					
Name	Description	Schedule	Recurrence		
Installation Profile	Easy Link Installation	No Schedule	-	<a href="#">Load</a>	
Profile 1	Profile 1	No Schedule	-	<a href="#">Load</a>	
Profile 2	Profile 2	No Schedule	-	<a href="#">Load</a>	
Profile 3	Profile 3	No Schedule	-	<a href="#">Load</a>	
Last loaded Profile : None		Description : None			
<b>Profile Calendar :</b>					
Select Profile : <input 4"="" type="text" value="---Select---&lt;/input&gt;&lt;/td&gt; &lt;td colspan="/> <a href="#">Time Server Not available</a>					
					<input type="button" value="Apply Changes"/>

Figure 7-5 Profile Manager

Table 7-3 Description of Commands

Page Item	Descriptions
<b>Save As:</b>	Select which profile name to save for the current configuration
<b>Profile Description:</b>	Specify a description for the profile to be saved.
<b>Save Profile button</b>	Click to save current profile
<b>Change Profile To:</b>	Select which profile to load as current configuration
<b>Profile Description:</b>	Description for profile to be loaded.
<b>Load Profile button</b>	Click to Load a specified profile
<b>Select Profile:</b>	Choose a profile to schedule

### 7.2.1. Save Profile

Follow the steps below to save the current configuration to a profile:

1. Select a profile name from 'Save As'.
2. Enter a description of the profile.

3. Click the 'Save Profile' button to effect the changes.
- 

**Note:** Existing configuration parameters in the selected profile name will be replaced with current configuration parameters.

### 7.2.2. Load Operating Profile

To load the desired operating profile, follow these steps:

1. Select a profile to load from the Profile Table.
  2. Click the Load button to load the selected profile.
- 

**Note:** Current configuration parameters will be replaced by the new loaded profile. User will be asked to wait while the new profile loads.

### 7.2.3. Profile Calendar

The Profile Calendar allows the user to manage profiles based on different calendar times. With it the different profiles and scheduled activities can be configured based on the profiles set for a pre-defined time.

A typical situation is when an operator has two profiles for day and night. The two different profiles can be created and saved as Profile Day and Profile Night. The Profile Calendar can then be scheduled to activate each profile at the correct time.


Follow the steps below to schedule the activation of a saved profile:

1. Select a profile to schedule.
  2. Uncheck the 'Disable Profile Calendar' check box. A profile calendar will be displayed.
  3. Select the date and time from the load time calendar. Choose a start date with the calendar icon.
  4. Select the recurrence (daily, weekly, monthly, only once).
  5. Click the 'Apply Changes' button. The schedule will be loaded either daily, weekly monthly or only once at the specified start date and time.
  6. To disable the scheduled profile, check the box 'Disable Profile Calendar'.
-

**Profile Calendar :**

Select Profile : Profile 1 [Time Server Not available](#) ☐ Disable Profile Calendar - Profile 1

(dd-mm-yyyy)      Hour      Minutes

Load time : 14-03-2005  10 : 20

Recurrence : ☐ Daily ☐ Weekly ☐ Monthly ☒ Only once

[Apply Changes](#)

**Figure 7-6 Scheduling a Profile**

### 7.3. Link Test

The Link Test utility is available from the navigation menu bar in the 'Tools | Link Test' drop down menu. From the Link Test tools, the user can test Throughput and perform Ping Test. You can run Radio Transmit or Radio Receive. The remote device will automatically start receiving /transmitting (provided an airPoint Nexus is used).

The remote radio IP address has to be specified for the test.

Follow the steps below to do a Ping Test:

1. Enter a valid IP address for Far-end Radio IP Address.
2. Click on the 'Start' button under 'Ping'. The Ping result will be displayed.
3. Click on the 'Stop' button to stop the test.

**Tools : Link Test**
airClient (sB3410) - [Bridge mode](#)

SSID : NEXUS\_MASTER  
Association Status : **Associated**

Channel : 1 - (2412 MHz)  
RSSI (dBm): -74

**Far-end Radio IP Address**

192 . 168 . 1 . 1

**Ping Test**  

Start Stop

**Throughput Test**  

Radio Transmit Radio Receive Stop

**Showing Ping Request**  
Packet 1: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 2: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 3: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 4: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 5: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 6: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 7: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 8: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64  
Packet 9: 64 bytes from 192.168.1.1: icmp\_seq=0 ttl=64

**Figure 7-7 Ping Test Result**

When the airClient in Bridge mode is associated with an airPoint Nexus, you can do a Throughput Test to test the speed of the link.

Follow the steps below to do a Throughput Test:

1. Enter a valid IP address of the far Radio.
2. Click on the 'Radio Receive' button on the near radio under the Throughput Test and the 'Radio Transmit' button at the far radio.



3. The Throughput test will start and the result will be displayed.
4. Click on the 'Stop' button if you want to stop the test.

**Note:** The Throughput Test can be done only between Nexus units.

Tools : Link Test

airClient (sB3410) - [Bridge mode](#)

SSID : NEXUS\_MASTER
Channel : 1 - (2412 MHz)

Association Status : **Associated**
RSSI (dBm): -92

Far-end Radio IP Address

192 . 168 . 1 . 1

Ping Test

Start
Stop

Throughput Test

Radio Transmit
Radio Receive
Stop

Throughput Test - Transmit

Test 1 :Successfully uploading @518 Kbits/sec  
Test 2 :Successfully uploading @500 Kbits/sec  
Test 3 :Successfully uploading @505 Kbits/sec  
Test 4 :Successfully uploading @494 Kbits/sec

**Figure 7-8 Throughput Test Result**

## 7.4. Link Budget Planning

Link Budget Planning is a very useful tool for link budget estimation. The Link Budget Planning Calculator can be accessed from the navigation menu bar 'Tools | Link Budget Planning Calculator' drop down menu.

A GPS Calculator is provided in the Link Budget Planning Calculator page to calculate the distance between two airClient and the access point stations.

To calculate the distance, follow the steps below:

1. Enter the GPS co-ordinates of Station 1 (Latitude1 and Longitude1) and Station 2 (Latitude 2 and Longitude 2). GPS co-ordinates may be entered in DD: MM:MM or DD: MM: SS.SS formats.
2. Select the distance units (miles or kilometers).
3. Click the 'Compute Distance' button to calculate the distance between the two stations.
4. The distance will be displayed in the Distance text box.

GPS Calculator					
Latitude1	Longitude1	Latitude2	Longitude2		
<input type="text" value="00:03.00"/>	<input type="text" value="00:00.00"/>	<input type="text" value="00:00.05"/>	<input type="text" value="00:00.00"/>		
<input type="button" value="N"/>	<input type="button" value="W"/>	<input type="button" value="N"/>	<input type="button" value="W"/>		
				<input type="button" value="Compute Distance"/>	
Course 1-2 (Degrees)		Course 2-1 (Degrees)		Distance	
<input type="text" value="180"/>		<input type="text" value="0"/>		<input type="text" value="3"/> miles	

**Figure 7-9 Link Budget Planning Calculator GPS Calculator**

Once the distance is computed follow the steps below for the link budget calculations:

1. Select the radio mode for station 1 and 2.
2. Enter the transmit output power in dBm for station 1 and 2.
3. Enter the antenna Gain in dB for station 1 and 2.
4. Enter the Cable Losses in dB for station 1 and 2.
5. Click the 'Compute Link Budget' button to calculate the link budget information.
6. The link budget information will be displayed in the following figure.

The link budget information includes the EIRP, Free Space Loss and Theoretical RSSI.

The Receive Sensitivity, Maximum Transmit Power, System Gain and Available Fade Margin at various Link Speeds are also computed and displayed in a table.

The Ideal fade margin for a link is between 10 dB to 20 dB for a stable link base on the environmental condition of a region.

Fresnel Zone Clearance Required will also be displayed.

Distance from Root Device to Remote Device is  miles (Please Select)

Root Device	Remote Device
Device : <input type="text" value="airPoint Nexus"/>	Device : <input type="text" value="airClient Nexus"/>
Radio Mode : <input type="text" value="High Band"/>	Radio Mode : <input type="text" value="High Band"/>
Tx Output Power (dBm) : <input type="text" value="18 dBm"/> (-5 to 23)	Tx Output Power (dBm) : <input type="text" value="18 dBm"/> (-5 to 23)
Antenna Gain : <input type="text" value="18"/>	Antenna Gain : <input type="text" value="18"/>
RF Cable Loss : <input type="text" value="3"/>	RF Cable Loss : <input type="text" value="3"/>
<input type="button" value="Compute Link Budget"/>	
EIRP : 33	33
Free Space Loss : 120.4	120.4
Theoretical RSSI (dBm) : <b>-72</b>	<b>-72</b> (Recommended minimum -75dBm)
Available Fade Margin (dBm) : 20	20
Fresnel Zone Clearance Required : 17 feet	
<input type="button" value="Save"/> <input type="button" value="Clear"/>	

**Figure 7-10 Link Budget Planning Calculator Link Budget**

## 8. Firmware Upgrade

The latest firmware for airClient Nexus is available for download from the smartBridges Support website at <http://www.smartbridges.com/support/acn.asp>

The airClient Nexus unit firmware can be upgraded from the web management interface.

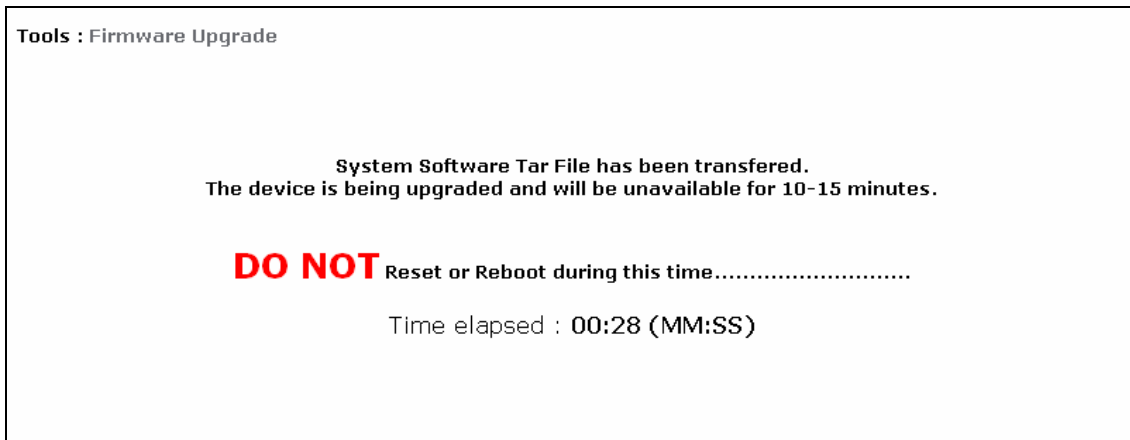
Follow the steps below to upgrade the airClient Nexus firmware:

1. Download the latest (or a particular release version) of the airClient Nexus firmware from the web-site <http://www.smartbridges.com/support/acn.asp>.
2. Login to the device web interface. Go to Tools | Firmware Upgrade drop down menu. The Firmware Upgrade page will be displayed as shown below.
3. Enter the firmware tar-ball file name downloaded in Step 1.
4. Click on the Upgrade button to upgrade the firmware.
5. When the firmware tar-ball file transfer is completed, a message will be displayed on the web-page.
6. Wait for about 10 minutes or so for the device firmware to be upgraded. Once the upgrade completes, a pop-up window displaying the upgraded firmware version will appear.

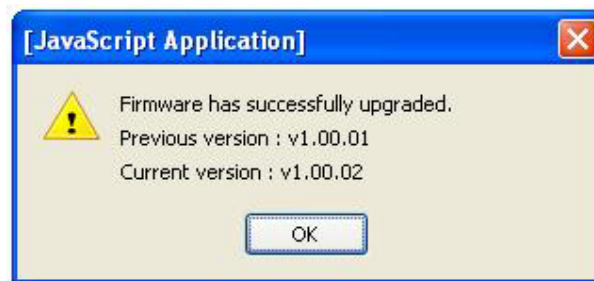
**Note:** During the upgrade period (about 10-15 minutes), the airClient unit must NOT be reset or power cycled.

Home	Networking	Radio	Tools	Help	Logout
Tools : Firmware Upgrade			airClient (sB3410) - <a href="#">Router mode</a>		
<b>Firmware Upgrade</b>					
Current Firmware Version		v0.00.02d			
Upgrade System Software Tar File		<input type="text" value="C:\SB3410_IXP_v0.00.02a.tar"/> <input type="button" value="Browse..."/>			
					<input type="button" value="Upgrade"/>

**Figure 8-1 airClient Nexus Firmware Upgrade page**



**Figure 8-2 airClient Nexus Firmware Upgrade (Firmware transferred)**



**Figure 8-3 Successful upgrade pop-up window**

## Appendix A – SNMP Trap

airClient Nexus generates SNMP trap that can be forwarded to the SNMP Trap server. The SNMP Trap server IP address is set in section.

The following table provides a list of SNMP traps generated.

Trap	Message
IP address	Object Identifier: 1.3.6.1.4.1.14882.2.1.1 Value: <changed IP address>
IP netmask	Object Identifier: 1.3.6.1.4.1.14882.2.1.2 Value: <changed IP netmask>
Gateway	Object Identifier: 1.3.6.1.4.1.14882.2.1.3 Value: <changed Gateway>
SSID	Object Identifier: 1.3.6.1.4.1.14882.5.1.3.3 Value: <changed SSID>
Radio Mode	Object Identifier: 1.3.6.1.4.1.14882.5.1.18 Value: <changed Radio Mode>  <b>Note:</b> Possible values for radio mode are given in the table below:

Value	airHaul	airPoint	airClient
0	Remote Router		Router
1	Remote Bridge		Bridge
2			
3	Root Bridge	Bridge	
4			NAT

## Appendix B – Useful terms and definitions

Acronyms and Abbreviations	
MAC	Media Access Control
RSSI	Receive Signal Sensitivity Indication
SSID	Service Set Identifier
DHCP	Dynamic Host Configuration Protocol
ACL	Access Control List
SNMP	Simple Network Management Protocol
NTP	Network Time Protocol
STP	Spanning Tree Protocol
TCP	Transmission Control Protocol
IP	Internet Protocol

### 802.11h

The 802.11h specification is an addition to the 802.11 family of standards for wireless local area networks (WLANs). 802.11h is intended to resolve interference issues introduced by the use of 802.11a in some locations, particularly with military radar systems and medical devices.

### 802.11Q

IEEE **802.11Q** defines a mechanism for tagging frames so that they can be segregated into separate **VLANs**.

### 802.11i

An upcoming security standard currently being developed by IEEE that features 802.1x authentication protections and adds AES (Advanced Encryption Standard) technology, a stronger level of security than used in WPA for encryption protection along with other enhancements.

### IEEE 802.1x

A security standard featuring a port-based authentication framework and dynamic distribution of session keys for WEP encryption. A RADIUS server is required.

### SSID

Each **ESS** has a Service Set Identifier (**SSID**) used to identify the **Radio** that belong to the **ESS**. **Radios** can be configured with the **SSID** of the **ESS** to which they should associate. By default, radios broadcast their **SSID** to advertise their presence.

### VLAN

A **VLAN** is a switched network that is logically rather than physically segmented. **VLANs** enable workstations and other devices to have a virtual association - independent of geographic location or physical attachment to the network. These groupings can be based upon organizational unit, application, role, or any other logical grouping.

### WEP

According to the IEEE 802.11 standard, **Wired Equivalent Privacy (WEP)** is intended to provide “confidentiality that is subjectively equivalent to the confidentiality of a wired local area network medium and that does not employ cryptographic techniques to enhance privacy.”

**WEP** relies on a secret key that is shared between a mobile station and an access point. **WEP** uses the RC4 stream cipher invented by RSA Data Security. RC4 is a symmetric stream cipher that uses the same variable length key for encryption and decryption. With WEP enabled, the sender encrypts the data frame payload and replaces the original payload with the encrypted payload. The sender then forwards the encrypted frame to its destination. The encrypted data frames are sent with the MAC header **WEP** bit set. Thus, the receiver knows to use the shared **WEP** key to decrypt the payload and recover the original frame. The new frame, with an unencrypted payload can then be passed to an upper layer protocol.

**WEP** keys can be either statically configured or dynamically generated. In either case, **WEP** has been found to be easily broken.

## WPA

Wi-Fi Protected Access (**WPA**) is a replacement security standard for **WEP**. It is a subset of the IEEE 802.11i standard being developed. **WPA** makes use of **TKIP** to deliver security superior to WEP. 802.1X access control is still employed. The **Authentication Server** provides the material for creating the keys.

## Packet Concatenation

Packet concatenation will increase the throughput of the equipment by simply buffering the packets at the transmitter and convert them into superframe for the transmission over the wireless interface.

## Packet Bursting

Packet bursting is for increasing the throughput by increasing the window size and reducing the time for acknowledgement.

## Packet Compression

LZO compression is being used to achieve more throughputs.

## COFDM

COFDM involves modulating the data onto a large number of carriers using the FDM technique. The Key features which makes it work, in a manner is so well suited to terrestrial channels, includes:

- Orthogonality (the “O” of COFDM);
- The addition of Guard interval;
- The use of error coding (the “C” of COFDM), interleaving and channel-state information

COFDM is resistant to multipath effects because it uses multiple carriers to transmit the same signal.

## Spanning Tree Protocol (STP)

STP is a Layer 2 link management protocol that provides path redundancy while preventing loops in the network. For a Layer 2 Ethernet network to function properly, only one active path can exist between any two stations. Spanning-tree operation is transparent to end stations, which cannot detect whether they are connected to a single LAN segment or to a LAN of multiple segments.

## RIP

The most popular of the TCP/IP interior routing protocols is the *Routing Information Protocol (RIP)*. RIP is used to dynamically exchange routing information. RIP routers broadcast their routing tables every 30 seconds by default. Other RIP equipments will listen for these RIP broadcasts and update their own route tables.

## DHCP



DHCP stands for 'Dynamic Host Configuration Protocol' and is a means for networked computers to get their TCP/IP networking settings from a central server. Importantly, DHCP assigns IP addresses and other TCP/IP configuration parameters automatically.

### SNMP

Short for ***Simple Network Management Protocol***, a set of protocols for managing complex networks. The first versions of SNMP were developed in the early 80s. SNMP works by sending messages, called *protocol data units (PDUs)*, to different parts of a network. SNMP-compliant devices, called *agents*, store data about themselves in *Management Information Bases (MIB)* and return this data to the SNMP requesters.

### SYSLOG

In order to track information on events, device jobs, and packets flows, most security devices output these events using the syslog information model. This output uses a specific format and protocol defined in RFC 3164.

## Appendix C – License

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